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AUTHOR Dodge, Bernard J.
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ABSTRACT

A review of the literature on interest and emotion provides an organizing framework for a conceptual model of learner interest in terms of its emotional components. The dimensions of pleasure and arousal are seen as closely related to those of evaluation and activity in a number of studies. A third dimension related to potency is also apparent in the studies cited. The model of learner interest which is proposed is based on research which shows a 3-factor structure of emotion, and on an analysis of the concept of learner interest. The four factors in the model (pleasure, arousal, competence feelings, and self-determination feelings) are related to the evaluation, activity, and potency dimensions of semantic differential research. The model may be useful as a conceptual tool to enable one to make finer distinctions than is possible with a single dimension ranging from boredom to high interest. As a guide toward the solution of instructional problems, the model would enable more precise diagnosis of motivational deficiencies in instruction. Further, it could be used with educational games and simulations, and in the design of responsive educational media. (MER)

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LEARNER INTEREST AND INSTRUCTIONAL DESIGN:

A CONCEPTUAL MODEL

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Bernard J. Dodge

Syracuse University

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INTRODUCTION

In 1968, George Leonard wrote a provocative book titled Education and Ecstasy. A chapter in the book described a visit to a typical school in the year 2001, and needless to say, it was very different from today's schools. While some may write the chapter off as an amalgam of all the hopes, fads and follies of the late Sixties, there are ideas in those pages that still seem exciting today.

One image from the book was that of a child seated at a console engaging in dialog with a computer. Their conversation was a combination of a spelling lesson and a poetry workshop, and the computer responded instantly to the child with moving graphics and sound. At times, the video display spilled over into the displays of the other children in the room, producing unpredictable connections between different lessons. It was a sort of individualized Sesame Street segment, a blend of structure and surprise. The children were learning and they were totally involved.

In most schools today, moments of high learner interest are not as common as they should be. Those of us working to improve education might consider Leonard's vision of the future as an ideal to be aimed for: instruction which is effective, involving, and enjoyable. Can we provide such instruction now? I would suggest that we know much more about the cognitive elements of instruction than about involvement and enjoyment. Educational research based on cognitive psychology has provided principles for

structuring and sequencing instruction for optimal learning but interest and motivation have either been assumed or neglected.

Sometime between now and 2001, we will need to learn a lot more about what makes things interesting. One way to begin is by studying the experience of being interested. What does instruction that is interesting and appealing feel like to the learner? The purpose of this paper is to review the literature on interest and emotion briefly, and to describe a conceptual model of learner interest in terms of its emotional components.

THE STUDY OF EMOTION

For much of this century, psychologists tended to avoid the empirical study of emotion. There were three reasons for this avoidance: 1) Behavioral scientists tended to view emotion as a unitary, global concept, which made operationalization difficult. 2) S-R drive-reduction principles dominated psychology. 3) There was no adequate theory dealing with separate and distinct emotions, each definable as a construct that could be studied by specified and repeatable operations. As a result, the realm of emotion remained a relatively unexplored territory (Izard, 1971).

When emotion was discussed within theories of motivation and behavior, it was often regarded as unidimensional. Hedonic theories of motivation tended to view emotion along a single

continuum of pleasantness-unpleasantness (e.g., McClelland, Atkinson, Clark, and Lowell, 1953). Activation theorists redefined emotion as arousal, varying along a sleep-tension dimension. One even advocated abandoning the term "emotion" altogether (Duffy, 1962).

One aspect of emotion that lent itself to scientific study was the area of facial expressions. Typical experiments involved the rating of photographs of an actor displaying a range of emotions. Pairs of photographs were rated for their degree of similarity, and statistical analysis revealed the underlying dimensions of variation. In all studies, two dimensions appeared: Pleasant-Unpleasant, and Sleep-Tension (Schlosberg, 1954; Gladstones, 1962). A third dimension sometimes appeared in such studies, but it was usually weak and difficult to interpret. Abelson and Sermat (1962) concluded that a 2-dimensional model adequately accounted for differences in facial expression.

In contrast to studies of facial expression, research on verbal reports of emotion has often shown a three-dimensional structure. Izard (1972), for example, gave subjects the names of the eight fundamental emotions in his typology and asked them to recall a situation in their lives in which each emotion was strongly experienced. The eight emotions were: fear, shyness, interest, distress, anger, guilt, joy, and surprise. For each situation, The subjects also filled out a rating scale which asked them how active, deliberate, tense, impulsive, controlled, self-assured, extraverted, and pleasant they felt.

Analysis of the ratings showed that the Pleasantness, Tension, and Self-assurance dimensions were the best combination to distinguish the eight emotional situations. Joy, for instance, was characterized as being high in Pleasure and Self-assurance, and low in Tension. Izard concluded that the three dimensions of Pleasure, Tension, and Self-assurance represent the underlying structure of subjective experience of which emotion is one aspect.

In another attempt to uncover the dimensions of emotion, Bush (1973) had subjects rate pairs of emotional adjectives (e.g., sleepy, outraged, delighted) on a 10-point similarity scale. The ratings were analyzed by multidimensional scaling analysis. Three dimensions emerged: the first two were Pleasantness-Unpleasantness and Level of Activation. These are similar, if not identical to, the Evaluation and Activity dimensions found in semantic differential research, (Osgood, Suci, & Tannenbaum, 1957) and are also the factors found in studies of facial expression.

Bush labelled the third factor found in his study "Aggression", though he noted that the scale was not easily interpreted. At one end were adjectives like "outraged" and "delighted", while at the other were "sympathetic", "needed" and "desperate". He concluded that this dimension was closely related to the Potency scale of the semantic differential and, more specifically, seemed to refer to interpersonal potency.

Additional support for a three-factor model of emotion comes from work by Mehrabian and Russell in the field of environmental psychology (1974). Based on previous research, they postulated that the emotional response to an environment can be described along the dimensions of Pleasure, Arousal, and Dominance, in parallel to Evaluation, Activity, and Potency (Osgood, Suci, & Tannenbaum, 1957). They constructed an 18-item measure based on these factors and used it both as a measure of personality and as a state measure of emotional response. The measure was found to relate as they predicted with measures of anxiety (high Arousal, low Pleasure and Dominance), sensitivity to rejection (low Dominance), and several other measures. The state emotional response scale was used to measure reactions to a number of environmental situations, and the three dimensions of emotion were significant predictors of various approach and avoidance behaviors (Mehrabian & Russell, 1974).

A later study (Russell & Mehrabian, 1977) used the same scale to rate adjectives which depicted a full spectrum of emotions. A total of 151 terms were used, and each subject rated 10 to 20 of them. Again, the Pleasure, Arousal, and Dominance scales showed high reliability (.97, .89, and .87) and all three scales were necessary to distinguish among the emotional adjectives.

To summarize, two dimensions --Pleasure and Arousal-- have been shown to underlie a wide range of emotional outcomes. These two dimensions are seen as closely related to the dimensions of Evaluation and Activity which consistently appear in studies using

the semantic differential technique. Several studies also provide evidence for a third dimension of emotion, one which is related to potency. These studies are summarized in Table 1.

STUDY	STIMULI	DIMENSIONS
Schlosberg, 1954	Facial expressions	Pleasantness-Unpleasantness Sleep-Tension Attention-Rejection
Gladstones, 1962	Facial expressions	Pleasantness-Unpleasantness Sleep-Tension Expressionless-Mobile
Abelson & Sermat, 1962	Facial expressions	Pleasantness-Unpleasantness Sleep-Tension
Izard, 1972	Recalled emotional situations	Pleasantness Tension Self-assurance
Bush, 1973	Emotional adjectives	Pleasantness-Unpleasantness Level of Activation Agression
Mehrabian & Russell, 1974	Descriptions of environments	Pleasure Arousal Dominance
Russell & Mehrabian, 1977	Emotional adjectives	Pleasure Arousal Dominance

TABLE 1: RESEARCH ON DIMENSIONS OF EMOTION

EMOTION AND INTEREST

The emotional response that accompanies a state of interest has rarely been studied. In fact, with the exceptiсn of work by Csikszentmihalyi (1975), there has been almost no attempt to examine in depth what interest and involvement feel like to an individual. This gap in the literature has been well articulated in a review by deCharms and Muir (1978):

> Intrinsic motivation presents a fascinating case of the state of the art. Theories and data abcund. Are we making major advances in understanding motivation? Let us suggest that they are minor. We continually overlook our major source of knowledge --a personal, non-objective source which is at the heart of every minitheory but not acknowledged. Our methodologies fall short because they lead us into more and more detailed specification of external conditions for producing behavioral effects and ignore the critical variable, namely, the way the person experiences (not perceives) the conditions that we so elaborately contrive.(p. 107)

This is not to say that emotion has been totally ignored by those doing research on learner interest. Several theoreticians have called upon emotions as explanatory variables in their

writings. Berlyne (1960), for example, said that curiosity comes as a result of a desire to maintain an optimal level of arousal. Things that are puzzling or incongruous cause a rise above the optimal level, and the individual studies and processes the stimulus to reduce uncertainty and bring arousal back to comfortable levels.

Theories of intrinsic motivation have also been based on affective concepts. White (1959) wrote of an innate need to feel effective, while Deci (1975) called it a need to feel competent and self-determining. Both of these needs were used to explain why we do things that have no extrinsic rewards attached, why we are interested in some activities for their own sake.

Another line of research on interests has involved the development and use of interest inventories: scales to measure preferences among sets of school subjects or vocations. The interest inventory can be viewed as a technological extension of hedonistic theories of motivation. That is, they assume implicitly that we are pleasure-seeking creatures who arrange our activities to maximize pleasure (Travers, 1978).

The major work to date which studied the actual experience of interest and involvement was described in a book by Csikszentmihalyi (1975). Csikszentmihalyi surveyed and interviewed chess players, rock climbers, surgeons and others to examine what made their activities self-rewarding. He discovered several qualities that seemed to characterize the occurance of intrinsic motivation, a state of mind that he called "flow".

Among these were a merging of action and awareness, the centering of attention, and the loss of self-consciousness. In emotional terms, the flow experience combined enjoyment, a feeling of mastery and control, and a level of arousal midway between boredom and anxiety.

Within this sample of inquiry in the area of interest, several different emotional variables have been cited as causes or correlates of interest. One might infer from this that interest is not a simple, pure emotion like happiness, for example, but a complex combination of feelings. If this is so, then perhaps the existing minitheories of curiosity and intrinsic motivation are accurate but incomplete, like the fabled blind men's description of the elephant. The tendency to regard interest as one-dimensional has held back progress toward understanding it, and prevented the building of a cumulative body of research.

A MODEL OF LEARNER INTEREST

If interest is multidimensonal, what are its dimensions? A logical analysis of the concept would suggest that the three factors underlying other emotions also make sense as dimensions of interest. The Pleasure-Displeasure dimension, for instance, is clearly relevant. To be interested is a pleasant feeling, and to be bored is not.

The Arousal dimension seems applicable to interest as well. Any definition of interest would have to include notions of a heightened awareness and attention, both of which are associated with moderate to high levels of arousal. Drowsiness and lack of interest, on the other hand, are states of low arousal. As already noted, arousal also figures prominently in previous research. The best articulated theory of curiosity, that of Berlyne (1960, 1963), is built around the concept of arousal. In addition, the "flow" state studied by Csikszentmihalyi (1975) was characterized by a facilitative level of arousal.

Thus a case can readily be made for Pleasure and Arousal as factors underlying learner interest. But what about the third dimension, one that is related to the Potency (strong-weak) dimension of semantic differential research? The question can best be addressed at a more abstract level: In an educational setting, what does it mean to feel stronger or weaker?

Learning adds to one's skills and abilities, and thus enables one to deal more effectively with the world. In a sense, an increase in competence is an increase in power. To feel more competent is to feel stronger, while incompetence and weakness are inextricably linked. Thus it would seem that a dimension of Competence - Incompetence feelings is an appropriate translation of potency within the context of learning.

The Competence Feeling dimension is tied to interest by some theoretical work already cited. Deci's cognitive evaluation theory proposes that activities which enhance a feeling of

competence and self-determination are intrinsically motivating (1975). Such activities are done for their own sake, without the need for external compensation.

In an essay on interest and effort in education, Dewey (1913) made a distinction relevant to the Competence Feeling dimension. He said that there are two types of pleasure. One arises from contact with pleasurable stimuli such as bright colors and agreeable sounds. The second accompanies activity and is found wherever there is successful achievement and mastery occurring. These two types of pleasure are reflected in the present model as the Pleasure and Competence Feeling dimensions, respectively.

Dewey had few kind words for school activities which excite the senses but do not engage the learner in activity geared toward mastery. This same concern is echoed today in criticism about some educational media. In terms of the model, instruction which produces high levels of Arousal and Pleasure, but does not arouse Competence Feelings can be said to be more entertaining than educational. High levels of Pleasure, Arousal, and Competence Feelings, on the other hand, would indicate genuinely engrossing instruction.

Empirical evidence for the appropriateness of a competence feeling dimension comes from a study of what makes an educational television program interesting (MacLean et al, 1960). In a linkage analysis of viewer ratings of several program segments, factors of Evaluation (good-bad) and Activity (fast-slow) emerged which are closely linked to the Pleasure and Arousal dimensions

discussed above. In addition, a third factor appeared which had to do with how well the program was understood. The researchers named this factor Simplicity, but it is clear from the items which loaded on the factor that it could as easily been interpreted as a dimension of Competence Feelings.

Thus far, we have described learner interest as having underlying dimensions of Pleasure, Arousal, and Competence Feelings. There is one more dimension yet to be described, one which also has to do with potency.

Strength and weakness in an educational context can also be conceptualized in another way. One is strong when one controls the content and mode of presentation of what is being learned. Weakness is having no such control. This second type of potency dimension is linked to learner interest by the widely held assumption that learner control enhances motivation. This assumption is intrinsic to the open school movement, and there is some empirical support for its validity (for example, Myrow, 1979). This feeling of being in charge of one's learning is closely akin to the Pawn-Origin dimension described by deCharms (1968, 1976). To use Deci's (1975) terminology, this dimension might be referred to as one of Self-determination Feelings.

To summarize the discussion to this point, a four-factor model of learner interest has been proposed. The rationale of the model is based on research showing a three-factor structure of emotion, and on a logical analysis of the concept of learner interest. The four factors are related to the Evaluation,

Activity, and Potency dimensions of semantic differential research (Osgood, Suci, Tannenbaum, 1957) as follows:

SEMANTIC DIFFERENTIAL DIMENSIONS	LEARNER INTEREST DIMENSIONS
Evaluation	Pleasure
Activity	Arousal
Potency	Competence Feelings
	Self-Determination Feelings

USES OF THE MODEL

This model may be useful both as a conceptual tool and as a guide toward the solution of instructional problems. At the conceptual level, the model helps to bring diverse theories and approaches together within one framework. This provides a more holistic view of interest, affect and motivation and makes it easier to compare theories or to combine different theoretical perspectives.

The model also enables one to make finer distinctions than is possible with a single dimension ranging from boredom to high interest. The four factors can economically portray a wide range of affective/motivational responses to instruction. For example, one form of boredom might be represented by a combination of negative pleasure and low arousal. A closely related state would

be drowsiness, which is mildly pleasant and low in arousal. The combination of high pleasure, moderate arousal and neutral competence and self-determination feelings might constitute a sort of passive fascination. Perhaps the optimum response for designers to strive for would be what Csikszentmihalyi (1975) calls "flow", a state of total involvement consisting of moderate arousal and high pleasure, competence, and self-determination feelings.

This ability to make fine distinctions among various types of boredom and interest also suggests uses for the model in solving instructional problems. Evaluation instruments could easily be constructed to measure each of the four dimensions, and could be used in the formative evaluation of instructional materials and presentations. A semantic differential format would be appropriate, with several scales for each dimension. Such an instrument would contain items such as the following:

While reading the textbook, I felt...

happy :...:...:...:...:...:...:...: sad

calm :...:...:...:...:...:...:...: excited

competent :...:...:...:...:...:...:...: incompetent

free :...:...:...:...:...:...:...: constrained

Using evaluation tools based on these four factors would enable more precise diagnosis of motivational deficiencies in instruction. A low level of competence feelings, for example, would indicate that the instruction simply doesn't teach well. Or, more interestingly, it might indicate that competence has crept up on the learners so gradually that they don't realize how much they have learned. In such a case, the remedy might be to add a challenging practice exercise that calls upon all of the newly acquired knowledge and skill.

While texts, audiovisual media, or live presentations can be evaluated this way, these four factors seem especially appropriate for use with educational games and simulations. These have a dual nature: they are supposed to be educational and they are supposed to be fun. Educational outcomes can be gauged by conventional measures of competence, and the affective counterpart of learning can be measured by a Competence Feeling scale. The fun-ness of a game should be directly related to the Pleasure and Arousal it evokes. The degree to which players feel self-determining may also be an important predictor of the overall success of a game.

Another possible use of the model would be in the design of responsive educational media. Presently, CAI and interactive videodisc programs respond primarily to the cognitive needs of the learner, providing more examples or practice when called for. It isn't difficult to imagine a more fully responsive program which takes the learner's emotional state into account and adjusts the instructional presentation when interest flags. The learner might

indicate interest by the scale already described, or perhaps by physiological means of input (see Clynes, 1977; Knirk & Spindell, 1975). In any case, much research is needed before interest-enhancing adjustments can be prescribed with much certainty.

RESEARCHABLE QUESTIONS

A good conceptual model does two things: it organizes what is known and helps us formulate questions about the unknown. The model described in this paper provides an organizing framework for several distinct theories and conceptualizations of interest. It also suggests a number of questions in two general categories: 1) How do various instructional design techniques affect the emotional dimensions of learner interest? 2) How do the emotional dimensions relate to behavior? Discussion of a few representative questions in each category follows.

What is the effect on emotion of anecdotes and other human interest content? Flesch (1948) devised a widely used formula to measure the human interest level of text. The formula is based on counts of personal words (nouns and pronouns of natural gender) and personal sentences (quotes, questions, commands, exclamations, requests, and other sentences directly addressing the reader). Arbitrary as this may seem, this Human Interest score was highly correlated (rho = .83) with student ratings of interestingness in

two separate studies (Croll & Moskaluk, 1977; Gillen et al, 1977). McConnell (1978) attributes much of the success of his best selling psychology text to his use of anecdctes, which also give the text high scores on the Flesch measure.

What sort of interest is evoked by using anecdotes to make a text more personal? If the anecdotes entertain but do not instruct, then it would seem that Pleasure and Arousal are involved. If the anecdotes aid learning by making ideas more concrete, then perhaps Ccmpetence Feelings are also raised, in addition to Pleasure and Arousal. This distinction is important for the design of instructicn and merits further research.

What is the effect of varying the presentation format? The need for variety in presentation to maintain interest is well established in the ccnventicnal wisdom among teachers. Within a given medium of instruction, it is possible to present information in many different ways: tables, diagrams, question and answer interviews, anecdotes, metaphors, drills, and the usual expository prose. Recent research shows that different types of reading material engage the left and right hemispheres in different ways. Shifting the format from one type to another may have affective consequences. Berlyne's theory of epistemic curiosity (1960) suggests that each format change would cause a mcmentary rise in arousal as the learner gets oriented to the new format.

This raises several interesting questiors. To maintain optimal arousal within a lesson, how often shcuild the presentation format be changed? How does this rate interact with learner

characteristics? Which pairs of formats result in the greatest arousal increments? Does allowing the learner to choose the presentation format significantly increase feelings of self-determination?

How do the emotional dimensions of learner interest relate to behavior? While interest during instruction is a desirable goal in itself, it is also important as the means to several ends. One such end is improved performance. Some studies support the commonsense notion that students learn more from material they find interesting (e.g., Asher, Hyman, & Wigfield, 1978; Fass & Schumacher, 1978). Other research finds no clear relationship between interest and learning (Wood, 1974). The problem with research in the latter category, however, may be that interest was assumed to be unidimensional. Research using a multidimensional approach might shed more light on the relationship between interest and learning.

Another important behavior related to interest is continuing motivation. Continuing motivation is briefly defined as "the tendency to return to and continue working on tasks away from the instructional setting in which they were initially confronted. This return is presumably occasioned by a continuing interest in the task and not by external pressure of some kind" (Maehr, 1976). Continuing motivation can be seen as an ideal outcome of schooling, given the speed with which knowledge becomes outdated. It is also important because there is seldom, if ever, enough instructional time available to convey everything worth knowing

about a subject. When motivated to do so, students can quickly augment their education by pursuing a subject on their own time.

Is the tendency to continue learning about a subject related to the emotional response that accompanied the initial learning situation? In terms of the present model, continuing motivation might be predicted best by the Competence and Self-Determination Feelings evoked during instruction. Pleasure and Arousal, in contrast, may be more closely related to behaviors which demonstrate interest during the instructional period, and be only weakly related to a continuing interest in the material.

CONCLUSION

As the preceding sample of questions indicates, there is much yet to be learned about interest in education. In time we should be able to design instruction that can be relied on to interest a given audience, but for now our designs are based on intuition and luck. The new media of microcomputers and interactive videodisc present us with the opportunity to teach and fascinate at the same time. In order to realize the full potential of these media, we need to be clear about what learner interest is and what we can do to enhance it. The model described in this paper is offered as a small step in that direction.

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